

on such ground, but I have been expecting for some time to see some one call attention to this subject, and wondering that so many statements have passed unchallenged. Queries 44, 45, 46 and 47, are hardly, such as the experience of practical bee keepers will enable them to answer, but should rather be referred to scientists. Perhaps Prof. Cook and Mr. Corneil will help us out.

PROF. A. J. COOK, LANSING, MICH.—No. Honey is mostly sugar which has six parts carbon, six oxygen and twelve of hydrogen. (2) All assimilation or dissimilation in the body causes heat. Hence the change of any food into tissue or of tissue into waste generates heat. Sugar is an important element in food of most animals, but I question the accuracy of the common statement that it is a heat producer. It is a question if any food is exclusive for the formation of heat. All food is to nourish, and in this act heat results.

DR. J. C. THOM, STREETSVILLE, ONT.—The sweetening power of honey depends on varying amounts contained in it of the three principal sugars, sucrose or cane sugar, levulose or fruit sugar and Glycogen. From the formula of sugar  $C_{12}H_{22}O_{11}$  the above statement would not be correct. It is certainly not. (2) But only in consequence of the large proportion of carbon uniting with the oxygen of the air in the lungs, that it becomes a heat producing food. Query—Is the author of this and No. 45 an honest bee keeper in quest of knowledge or a waggish medical student with a love for "crux" questions?

E. POND, JR., FOXBORO, MASS.—(1) Yes. (2) Yes. A scientific explanation might be given, but it would require a large amount of space, as the questions involved are of such importance, that volumes have been written in regard to them. Chemistry has done much to solve a problem of which our forefathers were in ignorance, and to give the processes by which the problem has been solved would require a large amount of research that can hardly be expected to be given. Oxygen is the source of heat, and as a consequence the source of life itself. Without it all nature would give up the ghost and that would end the matter.

G. W. DEMAREE, CHRISTIANBURG, KY.—A great many statements have been made in the bee papers about the facts of which the writers know but little. Two things precisely alike according to the rules of chemistry may not be alike in fact or in effect. We breathe oxygen every day, and never take a drink of water without taking in oxygen and we could not live with-

out it and yet it is employed in connection with nitrogen to make "laughing gas." We know that honey is the natural food of bees, that it sustains life and that is really all we know, and all that is essential for the practical bee keeper to know. With oxygen in our honey, nitrogen in our "pollen" (Theory) and hydrogen to swell our air balloons we monopolize the the whole atmosphere. No disrespect to the querist, by no means, "come again."

S. CORNEIL, LINDSAY, ONT.—(1) According to Prof. Miley honey is composed of six parts of carbon, twelve of hydrogen and six of oxygen, from which it will be seen that oxygen constitutes one-third of the composition, (2) Certainly not. Starch, cellulose and saccharine matters are called carbo-hydrates or hydrates of carbon, because the oxygen is exactly sufficient to convert the hydrogen into water, the carbon alone being available for the production of heat. Butter contains very little oxygen, but as a heat producing agent it is just twice as great as lump sugar. The reason is that it contains more carbon and after the oxygen in the butter has satisfied the affinity of its equivalent of hydrogen to form water, there still remains a quantity of hydrogen and all the carbon to be oxidised. The amount of heat disengaged by the combustion of hydrogen is three times as great as that given off by its equivalent of carbon.

#### DIFFERENCE BETWEEN FERTILE QUEENS AND DRONE LAYERS.

QUERY No. 43.—I. How do you tell a fertile-queen from a drone-layer? (2.) What difference is there between a drone-laying queen's mode of laying eggs and that of a fertile worker? (3.) How do you tell the difference in the eggs before they are hatched?—J.

BY THE EDITOR.—Her actions are different, a fertile queen being less excitable. Drone layers when they become old are very stupid, and move around seemingly in a half sleepy condition. A fertile worker lays many of her eggs on the sides of her cells, especially worker cells. It is not easy to perceive the difference in the eggs before they are hatched. One way is by observing the position of the eggs.

P. S.—This should have been inserted last week but was overlooked.